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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/552,263	09/12/2006	Frank Duvinage	095309.56876US	6775

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EXAMINER	
EDWARDS, LOREN C	
ART UNIT	PAPER NUMBER
3748	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/552,263	DUVINAGE ET AL.	
	Examiner	Art Unit	
	Loren C. Edwards	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/5/05, 2/2/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 10/5/05 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement.

3. The information disclosure statement (IDS) submitted on 2/2/06 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner has considered the information disclosure statement.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 35-37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 35-37 recite the limitation "and/or by a combination of the two options". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 15, 18, 25, 28, 30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer et al. (U.S. 6,725,647) in view of Shiino et al. (U.S. 6,845,610). Pfeifer discloses an exhaust gas aftertreatment device for a motor vehicle comprising an NOx storage catalytic converter (Pfeifer; Fig. 3, No. 7) that is arranged in the main exhaust gas stream (Pfeifer; Fig. 3, No. 2) wherein the NOx storage catalytic converter is designed to remove NOx from lean exhaust gas by storing the NOx as the lean exhaust gas flows through the NOx storage catalytic converter and to generate N_2 by reducing the stored NOx when reducing exhaust gas flows through the NOx storage catalytic converter (Pfeifer; Col. 6, Lines 47-56); and an SCR catalytic converter (Pfeifer; Fig. 3, No. 6) that is arranged in the main exhaust gas stream downstream of the NOx storage catalytic converter, wherein the SCR catalytic converter is designed to reduce

NOx contained in the exhaust gas using NH_3 that has been generated by the NOx storage catalytic converter (Pfeifer; Col. 4, Lines 55-65). Pfeifer fails to specifically disclose wherein there is a reforming unit upstream of the NOx storage catalyst to generate hydrogen. Shiino discloses an exhaust gas purification method that teaches to place a reformer (Shiino; Fig. 1, No. 20) in the exhaust line (Shiino; Fig. 1, No. 14) to produce hydrogen from the exhaust gas (Shiino; Col. 1, Lines 5-25). It would have been obvious to one having ordinary skill in the art at the time the invention was made to place the reformer of Shiino upstream of the NOx catalytic converter of Pfeifer for the advantage of providing a demanded amount of reformed gas (Shiino; Col. 1, Lines 56-63).

9. With regards to claim 18, the modified Pfeifer discloses the exhaust gas aftertreatment device of claim 15, as described above, and further comprising a three-way catalytic converter (Pfeifer; Fig. 3, No. 3) that is arranged immediately downstream of the reforming unit (Shiino; Fig. 1, No. 20).

10. With regards to claim 25, the modified Pfeifer, as described in rejecting claim 15 above, discloses a reforming unit (Shiino; Fig. 1, No. 20) that is designed to generate hydrogen by at least one of steam reforming and partial oxidation of hydrocarbons (Shiino; Col. 1, Lines 5-25), wherein the reforming unit is arranged directly in a main exhaust gas stream (Shiino; Fig. 1, No. 14; Pfeifer; Fig. 3, No. 2) of an internal combustion engine, and wherein steam and residual oxygen which are required for reforming are derived from exhaust gas (Shiino; Col. 1, Lines 5-25); and an exhaust gas catalytic converter (Pfeifer; Fig. 3, Nos. 3, 6, and 7), wherein the exhaust gas catalytic

converter is arranged in the main exhaust gas stream downstream of the reforming unit, wherein the exhaust gas catalytic converter includes the functions of an NOx storage catalytic converter and an SCR catalytic converter (Pfeifer; Fig. 3, No. 6).

11. With regards to claim 28, the modified Pfeifer discloses the exhaust gas aftertreatment device of claim 25, as described above, and further comprising a three-way catalytic converter (Pfeifer; Fig. 3, No. 3) that is arranged immediately downstream of the reforming unit (Shiino; Fig. 1, No. 20).

12. With regards to claim 30, the modified Pfeifer, as described in rejecting claim 15 above, discloses an exhaust gas aftertreatment device for a motor vehicle, comprising a reforming unit (Shiino; Fig. 1, No. 20) that is designed to generate hydrogen by at least one of steam reforming and partial oxidation of hydrocarbons (Shiino; Col. 1, Lines 5-25), wherein the reforming unit is arranged directly in a main exhaust gas stream of an internal combustion engine (Shiino; Fig. 1, No. 14; Pfeifer; Fig. 3, No. 2), and wherein steam and residual oxygen which are required for reforming are derived from exhaust gas (Shiino; Col. 1, Lines 5-25); and a DENOX catalytic converter (Pfeifer; Fig. 3, No. 7) that is arranged in the main exhaust gas stream downstream of the reforming unit.

13. With regards to claim 32, the modified Pfeifer, as described in rejecting claim 15 above, discloses a method for operating an exhaust gas aftertreatment device, the method comprising: using hydrogen to reduce NOx in exhaust gas from an internal combustion engine of a motor vehicle by way of a catalytic converter (Pfeifer; Fig. 3, No. 7; Col. 6, Lines 46-56); generating the hydrogen onboard the motor vehicle by at least one of steam reforming and partial oxidation of hydrocarbons (Shiino; Fig. 1, No. 20;

Col. 1, Lines 5-25), wherein the steam and residual oxygen which are required for the reforming originates from the exhaust gas (Shiino; Fig. 1, Nos. 12, 14, and 26; Col. 1, Lines 5-25); and carrying out the reforming by a reforming unit arranged directly in a main exhaust gas stream from the internal combustion engine (Shiino; Fig. 1, No. 20).

14. Claims 16, 17, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer as applied to claims 15 and 25 above, and further in view of Patchett (U.S. 6,125,629). Pfeifer discloses the exhaust gas aftertreatment device of claims 15 and 26, as described above, but fails to specifically describe wherein there is an oxidation catalytic converter arranged downstream of the SCR catalytic converter. Patchett discloses an exhaust aftertreatment system for an internal combustion engine that teaches to place an oxidation catalyst (Patchett; Fig. 3, No. 52) downstream of an SCR catalyst (Patchett; Fig. 3, No. 51). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the oxidation catalyst of Patchett in the system of Pfeifer for the advantage of reduced emissions (Patchett; Col. 10, Lines 63-65).

15. With regards to claims 17 and 27, the modified Pfeifer discloses the device of claims 16 and 26, as described above, and further comprising a three-way catalytic converter (Pfeifer; Fig. 3, No. 3) that is arranged immediately downstream of the reforming unit (Shiino; Fig. 1, No. 20).

16. Claims 19, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer as applied to claims 15, 25, and 30 above, and further in view of Stroia et al. (U.S. 2004/0006975). Pfeifer discloses the device of claims 15, 25, and

30, but fails to specifically disclose wherein the reforming unit is designed as a catalytically active particulate filter. Stroia discloses an exhaust after treatment system for an internal combustion engine application that teaches a particulate filter that acts as a reformer to produce hydrogen (Stroia; Abstract). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the particulate filter of Stroia as the reformer of Pfeifer for the advantage of particulate emissions control.

17. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer as applied to claim 32 above, and further in view of Patterson (U.S. 6,732,506). The modified Pfeifer discloses the method of claim 32, as described above, and further comprising setting the temperature of the reforming unit by an air/fuel ratio (Pfeifer; Col. 3, Lines 51-65 – Setting the exhaust rich or lean will inherently including changing the exhaust temperature). Pfeifer fails to disclose wherein there is a wide-band lambda sensor. Patterson discloses an exhaust gas treatment system for an internal combustion engine that teaches to place a wide band lambda sensor upstream of an NOx trap (Patterson; Fig. 2, No. 52). It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the wide band lambda sensor of Patterson in the system of Pfeifer for the advantage of being able to provide feedback of the air-fuel ratio control (Patterson; Col. 4, Lines 1-11).

18. With regards to claim 34, the modified Pfeifer discloses the method of claim 33, as described above, and further comprising operating the reforming unit at an air/fuel

ratio in the range from approximately $0.5 < \lambda < 1.0$ (Pfeifer; Col. 6, Lines 46-56 – Rich conditions).

19. Claims 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pfeifer as applied to claims 15-19 above, and further in view of Gandhi et al. (U.S. 2004/0076565). Pfeifer discloses the system of claims 15-19, as described above which are essentially the same as the instant claims. The lone difference being the orientation of the SCR catalyst with respect to the NOx storage catalytic converter. Gandhi teaches that the location of an SCR catalyst is interchangeable with respect to an NOx trap (Gandhi; Figs. 7A and 7B). It would have been obvious to one having ordinary skill in the art to try the arrangements as taught by Gandhi in the system of Pfeifer as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Loren C. Edwards whose telephone number is (571) 272-2756. The examiner can normally be reached on M-TH 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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